REINZ-Dichtungs-GmbH 047P 0407

## Patent Claims

- Bipolar plate for fuel cells which comprises at least a shaped, at least partially conductive foil, the bipolar plate having a channel structure formed by the shaping of the foil to convey reactants to electrodes of adjacent fuel cells and to carry away reaction products,
  - characterised in that
  - a microstructure (4) is integrated into the foil (1) to increase the rigidity of the foil (1).
- 2. Bipolar plate according to claim 1, characterised in that the microstructure (4) comprises hexagons, triangles or a combination of various polygons which are joined together covering the surface at least partially.
- 3. Bipolar plate according to claim 1 or 2, characterised in that the microstructure (4) and/or the channel structure (2) of the foil (1) is/are embossed or etched.
- 4. Bipolar plate according to one of claims 1 to 3, characterised in that the microstructure (4) has a typical length scale (11) of between 1μm and 500μm, preferably between 1μm and 100μm.
- 5. Bipolar plate according to one of claims 1 to 4, characterised in that the foil (1) has a thickness of less than 0.5 mm, preferably between 0.05 mm and 0.2 mm.
- 6. Bipolar plate according to one of claims 1 to 5, characterised in that the microstructured foil (1) has in the region of channel bases (5) of the channel structure

region of channel bases (5) of the channel structure (2) trough-like depressions (6) for draining away condensed reaction products.

- 7. Bipolar plate according to claim 6, characterised in that the trough-like depressions (6) are formed by recessed centres (7) of hexagons, triangles or polygons forming the microstructure (4).
- 8. Bipolar plate according to one of claims 1 to 7, characterised in that the foil (1), in the region of a contact surface (3) to an electrode or gas-diffusion layer of an adjacent fuel cell, has hydrophobic properties, preferably due to superimposing a substructure (9) on the microstructure (4), utilising the Lotus effect, to guarantee an improved gas transport of the reactants to the electrode or gas-diffusion layer by keeping the corresponding region free of fluid.
- 9. Bipolar plate according to claim 8, characterised in that the substructure (9) has a typical length scale (11) of between 0.1μm and 50μm, preferably between 0.1μm and 10μm.
- 10. Bipolar plate according to claim 8 or 9, characterised in that the substructure (9) is realised by a coating (8) applied to the foil (1).
- 11. Method of manufacturing a bipolar plate or a constituent part of a bipolar plate for fuel cells by embossing an at least partially conductive foil in such a way that a channel structure is produced for conveying reactants to electrodes of adjacent fuel cells and for carrying away reaction products, characterised in that the foil (1), to increase the rigidity of the foil (1), is provided in the

same embossing process with a microstructure (4) which preferably comprises hexagons, triangles or a combination of various polygons, by using an embossing tool with corresponding microstructuring of an embossing surface.